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Features of Erythrocyte Morphology and Iron Metabolism in Patients with Helicobacteriosis

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Annotation: The purpose of this scientific work was to study the morphological properties of erythrocytes and indicators of iron metabolism in patients with helicobacteriosis. The presence of H. pylori was confirmed in patients based on enzyme-linked immunosorbent assay (ELISA) results. The levels of serum iron, ferritin, transferrin and total iron-binding capacity of blood serum were taken as the main indicators of iron metabolism in the body. The results of the study showed that significant differences in the average values of serum iron and ferritin were determined in the studied groups. At the same time, based on the correlation analysis, a significant relationship was shown between the titer of antibodies to H. pylori and the levels of ferritin and serum iron.

Key words: H. pylori; iron deficiency; iron metabolism; ferritin.

Introduction

Currently, iron deficiency (ID) and Helicobacter pylori (HP) infection are an urgent public health problem due to their high prevalence and a large number of negative consequences for both adults and children. According to experts from the World Health Organization (WHO), ID ranks first among the 38 most common human diseases [1,2,3,4].

The prevalence of H. pylori among all segments of the population is very wide. According to the literature, more than half of people worldwide are infected with this bacterium. In Africa, Mexico, South America and Central America, the prevalence of this infection reaches 70–90% among the entire adult population [5, 6, 7]. At the same time, anemia is one of the most important extragastroduodenal manifestations of HP infection. In this regard, the urgent tasks are a deeper study of the role of HP in the pathogenesis of iron deficiency anemia (IDA) and the definition of criteria for eradication therapy in the presence of ID to increase the effectiveness of ferrotherapy [8, 9, 10].

Despite the fact that there are the results of numerous studies confirming the role of HP in the development of ID, there are still unresolved issues related to determining the exact indications for specific therapy aimed at eradicating this infection in cases where patients with clinical and laboratory signs of ID do not have obvious symptoms. damage to the gastric mucosa.

Target. To study the features of violations of iron metabolism in patients with helicobacteriosis and their correlation with the level of antibodies to HP.

Material and research methods. The study included men aged 40 years and older, and women aged 50 years, who are in menopause, infected with HP with clinical and laboratory symptoms of ID.

The inclusion criteria were:

- HP infection, confirmed by two diagnostic methods - 13C-urease breath test and the presence of antibodies to HP in the blood according to the results of ELISA;

- the presence of clinical and laboratory signs of IDA;
- lack of clinical, laboratory and instrumental data for acute or chronic blood loss;
- Informed consent of the patient to participate in the study.

The study included:

the main group - 56 patients with IDA and confirmation of HP infection;

control group - 24 patients with IDA without HP.

The presence of H. Pylori was confirmed based on the results of ELISA for the corresponding antibody titer. The analysis of the following indicators of iron metabolism was carried out: the level of serum iron, ferritin, transferrin and total iron-binding capacity of serum.

Statistical analysis was carried out using the standard MS Office 2019 software package using nonparametric and parametric criteria. Differences were considered significant at $p<0.05$.

Results

Table 1 presents the results of studying the morphological properties of erythrocytes in patients in the study groups.

Table 1. Morphological characteristics of erythrocytes (M±m)

Index	Main group (n=56)	Control group (n=24)
Hemoglobin	96.76±9.23	93.31±7.72
Red blood cells	4.18±0.32	4.4±0.28
Mean erythrocyte volume (MCV)	83.32±1.52*	79.4±1.11
The number of patients with reduced MCV	29 (51.8%)	18 (75%)
Mean erythrocyte hemoglobin (MCH) - pkg	32.8±1.5	32.2±1.1
Number of patients with reduced MCH	44 (78.6%)	17 (70.8%)
Mean erythrocyte hemoglobin concentration (MCHC) -g/dL	37.4±1.12	35.1±1.4
Number of patients with reduced MCHC	30 (53.5%)	14 (58.3%)
Microcytic anemia factor (MAF)	9.8±1.1	11.3±0.8
Number of patients with reduced MAF	34 (60.7%)	19 (79.2%)

**-differences in comparison with the indicators of the control group are statistically significant at $p<0.05$;*

The results of studying the morphological characteristics of erythrocytes in the studied groups showed that there were no statistically significant differences in the average values of hemoglobin and erythrocytes ($p<0.05$). The data in the table show that statistically significant ($p<0.05$) differences were found between the average values of the mean erythrocyte volume (MCV) with higher values in the main group.

The results of comparing the number of patients in the group with reduced MCV showed that in the main group their proportion was 51.8%, while in the control group it was 75%. There were also no statistically significant differences found between the mean values of the mean hemoglobin content in an erythrocyte (MCH) ($p<0.05$). The proportion of patients with reduced MCH was also

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approximately equal and amounted to 78.6% in the main group and 70.8% in the control group. There were no statistically significant differences between the average values of the average concentration of hemoglobin in the erythrocyte (MCHC) in the studied groups ($p<0.05$). The proportion of patients with reduced MCHC was also approximately equal and amounted to 53.5% in the main group and 58.3% in the control group. However, some significant differences were found in the proportion of patients with reduced microcytic anemia factor (MAF). Thus, a comparison of the morphological parameters of erythrocytes in the studied groups did not reveal significant differences, with the exception of the average volume, which can be explained by the fact that the persistence of HP in the main group, in addition to iron deficiency in the body, can also lead to some degree of vitamin B12 deficiency, which entails the indicated changes. This aspect of helicobacteriosis is also insufficiently studied according to the literature, however, its further and deeper study was not included in the tasks of the current work. which can be explained by the fact that the persistence of HP in the main group, in addition to iron deficiency in the body, can also lead to some degree of vitamin B12 deficiency, which entails these changes. This aspect of helicobacteriosis is also insufficiently studied according to the literature, however, its further and deeper study was not included in the tasks of the current work. which can be explained by the fact that the persistence of HP in the main group, in addition to iron deficiency in the body, can also lead to some degree of vitamin B12 deficiency, which entails these changes. This aspect of helicobacteriosis is also insufficiently studied according to the literature, however, its further and deeper study was not included in the tasks of the current work.

Table 2 presents the results of the study of iron metabolism in the study groups.

Table 2. Indicators of iron metabolism in the studied groups.

Index	Main group (n=56)	Control group (n=24)
Serum iron (μmol/l)	7.82±1.12*	9.42±0.42
TIBC (μmol/l)	67.1±2.7	68.1±1.5
Transferrin (g/l)	4.1±0.7	4.7±1.1
Ferritin (μg/ml)	120.43±10.2*	134.34±9.5

*-differences in comparison with the indicators of the control group are statistically significant at $p<0.05$;

Figure 1 shows the distribution of patients by ferritin level.

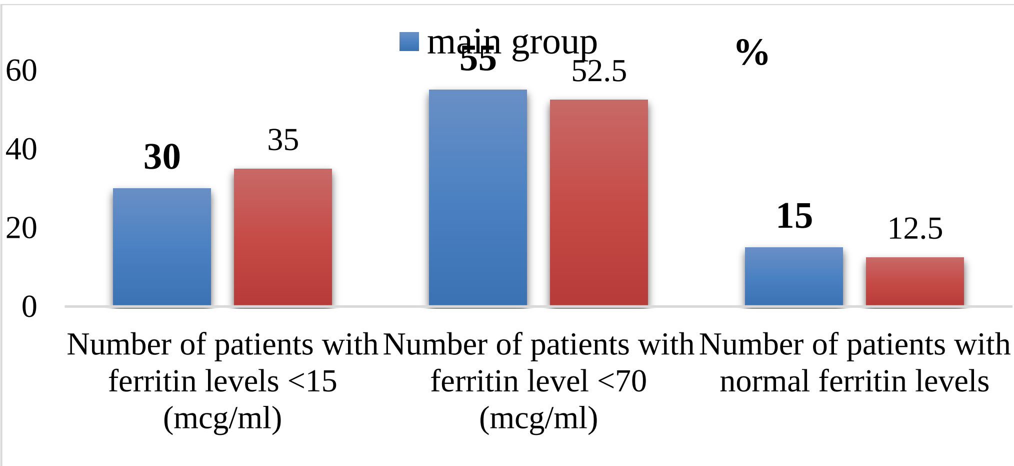


Figure 1. Distribution of patients by ferritin level.

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To clarify the relationship between iron metabolism parameters in patients with HP infection, a correlation analysis was carried out. The data reflecting the correlation relationships are presented in Figure 2.

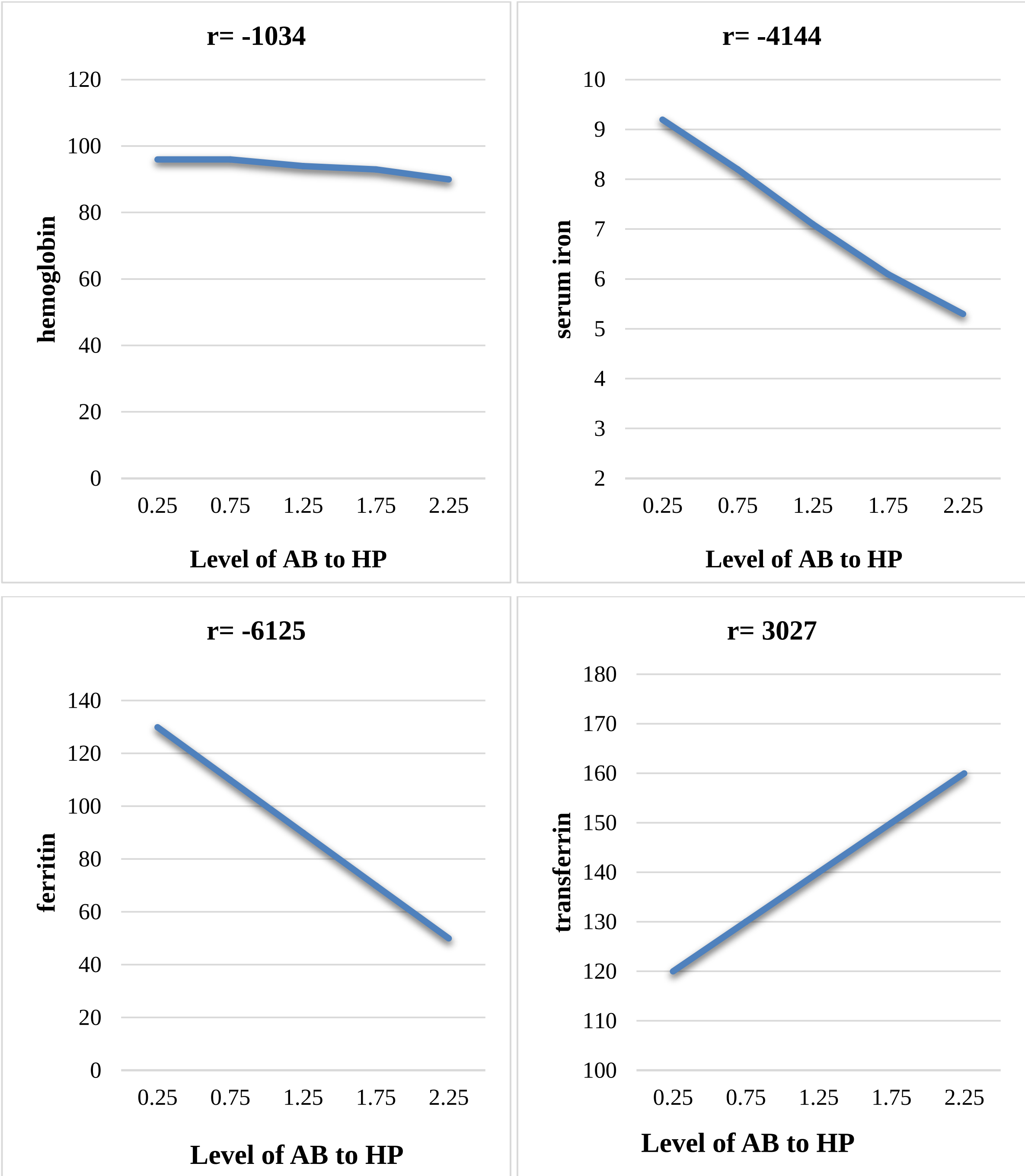


Figure 2. The results of the analysis of the correlation between the indicators of iron metabolism in the body and the level of antibodies to H. pylori.

Significant correlations were found between indicators of iron metabolism - iron in blood serum and ferritin, as well as the level of antibodies to H. pylory. The established correlation relationship was a confirmation of the reliability of the results of the studies.

Conclusion

In this way,on the basis of a study of the clinical and laboratory features of the disease, it was found that IDA associated with helicobacter pylori is characterized by more pronounced manifestations of sideropenic symptoms and more severe violations of iron metabolism in the form of serum iron, ferritin and TIBC by an average of 12%. At the same time, the existence of a significant correlation between the titer of antibodies to HP and the indicators of ferritin and serum iron in patients with IDA associated with helicobacteriosis was established.

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